

**IN THE CLAIMS:**

Kindly cancel claims 1, 2, 4-27 and 32-42 without prejudice.

Please add the following new claims 43-50:

- 1    43.    (New)            A method of estimating an amount of a tape of known thickness on a tape  
2    reel in a tape system, said tape reel defining a minimum tape-pack radius, said method compris-  
3    ing the steps of:  
4            measuring at intervals an angular position of said tape reel as said tape reel is rotated by  
5    said tape system;  
6            determining at said intervals a measured length of tape transferred onto or from said ro-  
7    tated tape reel;  
8            providing, in a Kalman filter employed in a processor, a mathematical model of dynamics  
9    of said tape system that affect rotation of said tape reel and transfer of said tape onto or from said  
10   tape reel, said mathematical model configured to estimate said amount of tape on said tape reel  
11   and an associated error variance; and,  
12            estimating for selected intervals, by said processor employing said Kalman filter, said  
13   amount of tape of said known thickness on said tape reel defining said minimum tape-pack ra-  
14   dius and said associated error variance based on sequential angular-position measurements of  
15   said tape reel and the measured length of tape that is transferred onto or from said tape reel be-  
16   tween said sequential angular-position measurements.
- 1    44.    (New)            The method of claim 43, wherein a tape-pack radius is estimated to pro-  
2    vide said estimated amount of tape on said tape reel.
- 1    45.    (New)            The method of claim 43, wherein said tape system includes a capstan that  
2    engages said tape and is rotated to transfer said tape onto or from said tape reel, and said step of

3 determining at said intervals a measured length of tape transferred onto or from said rotated tape  
4 reel, further comprises the step of:

5 measuring a change in angular position of said capstan as said tape is transferred onto or  
6 from said tape reel during said intervals.

1 46. (New) The method of claim 45, wherein said tape system includes a tape-tension  
2 arm that engages said tape and is angularly displaced by changes in tension in said tape which  
3 alter a tape-path length along which said tape is transferred onto or from said tape reel, and said  
4 step of determining at said intervals a measured length of tape transferred onto or from said ro-  
5 tated tape reel, further comprises the step of:

6 measuring a change in angular position of said tape-tension arm as said tape is transferred  
7 onto or from said tape reel during said intervals.

1 47. (New) A system adapted to estimate an amount of a tape of known thickness on a  
2 tape reel in a tape system, said tape reel defining a minimum tape-pack radius, said system com-  
3 prising:

4 a first transducer operatively associated with said tape reel to measure at intervals an an-  
5 gular position of said tape reel as said tape is transferred onto or from said tape reel by said tape  
6 system;

7 a second transducer operatively associated with said tape to determine at said intervals a  
8 length of tape transferred onto or from said rotated tape reel; and,

9 a processor employing a Kalman filter configured with a mathematical model of dynam-  
10 ics of said tape system that affect rotation of said tape reel and transfer of said tape onto or from  
11 said tape reel, said processor employing said Kalman filter for estimating said amount of tape of  
12 said known thickness on said tape reel defining said minimum tape-pack radius based on se-  
13 quential measurements of said first transducer during a selected time interval and sequential  
14 measurements of said second transducer during said selected time interval.

1 48. (New) The system of claim 47, wherein said tape system includes a cylindrical  
2 member that engages said tape and rotates as said tape is transferred onto or from said tape reel,

3 and said second transducer measures at said intervals an angular position of said cylindrical  
4 member that rotates as said tape is transferred onto or from said tape reel to determine said  
5 length of tape transferred onto or from said rotated tape reel.

1 49. (New) The system of claim 48, wherein said cylindrical member is a capstan that  
2 engages said tape and is rotated to transfer said tape onto or from said tape reel.

1 50. (New) The system of claim 47, wherein a tape-pack radius is estimated to provide  
2 said estimated amount of tape on said tape reel.